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### **Amendments to the Drawings**

An amended Fig. 1 is attached to this paper and includes both a replacement sheet and an annotated sheet showing drawings.

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### REMARKS

Minor corrections have been made to the specification. Applicants hereby enter a substitute specification into the application. A clean copy and marked-up copy are enclosed herewith. Now new matter has been added. A missing numeral has been added to Fig. 1. Claim 1 has been cancelled. Claims 2-9 have been amended. Claims 10-12 have been added. Claims 2-12 remain pending. Reconsideration and reexamination of the application, as amended, are requested.

The Examiner objected to the drawings by indicating that they failed to show reference numeral "1" as described in the specification. Fig. 1 has been corrected so as to add reference numeral "1". The objection should no longer be appropriate.

The Examiner objected to the specification by indicating that the term "spring-action cast rods" seemed to be a literal translation from German and the Examiner recommended using "flexible case rods". Applicant has accepted the Examiner's recommendation. In addition, other minor corrections have been made. It is submitted that the objection to the disclosure is no longer appropriate.

The Examiner rejected claims 1-9 because of various informalities. Applicant has considered the Examiner's comments, and the claims have been appropriately corrected.

The Examiner rejected claims 1 and 4-8 under 35 USC 102(b) as being anticipated by Hauer.

Hauer discloses an arrangement which includes a frame and a cover. The arrangement includes hinge devices having cells 10 (see Fig. 3) and projecting parts 30A 30B (see Fig. 6). Note that projecting parts 30A and 30B are a part of the cover, but not a part of flexible rods attached to the core of the cover. Hauer also discloses an elastic flexible finger 36 which engages a lug 14. Note that the lug, however, is a projection from a wall of the frame (see Fig. 10).

Claim 1 has been rewritten as claim 10. The cover arrangement of claim 10 includes a frame defining a plurality of bearing recesses. The arrangement has a cover which, together with the frame, includes hinge devices and latch devices. Claim 10

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requires that at least one of the hinge devices and the latch devices have flexible cast rods that are integrally connected to the cover such that the flexible cast rods include projections insertable in the bearing recesses of the frame. Hauer does not disclose flexible cast rods for either hinge devices or latch devices which include projections that are insertable into bearing recesses of a frame. As indicated above, the projections 30A and 30B of Hauer are not associated with flexible cast rods. Furthermore, flexible finger 36 has an end which engages a projecting lug 14, not a bearing recess. The structure of the cover arrangement of claim 10 is not disclosed by Hauer. Claim 10 is not anticipated by Hauer and is patentable thereover.

The other claims pending depend from claim 10 and are also patentable. Applicant does not acquiesce in the rejection of claims 2-9, but further comment on them at this time is not needed.

Basis for claim 10 is found in claim 1, page 3, lines 17-31 and elsewhere in the specification and drawings. Basis for claim 11 is found in Fig. 1. Basis for claim 12 is found on page 9, line 15 to page 10, line 11 and in Fig. 1, as well as elsewhere in the specification and drawings.

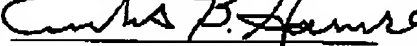
In view of the above, it is submitted that the application is in condition for allowance. Reconsideration and reexamination is requested. Allowance of claims 2-12 at an early date is solicited. Any questions regarding this communication can be directed to the undersigned attorney, Curtis B. Hamre, Reg. No. 29,165 at (612) 455-3802.



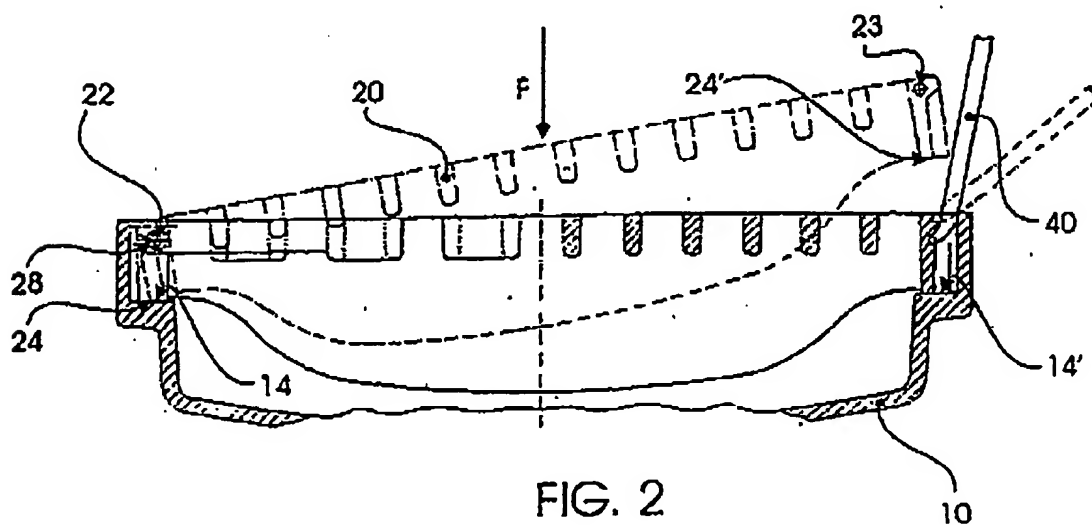
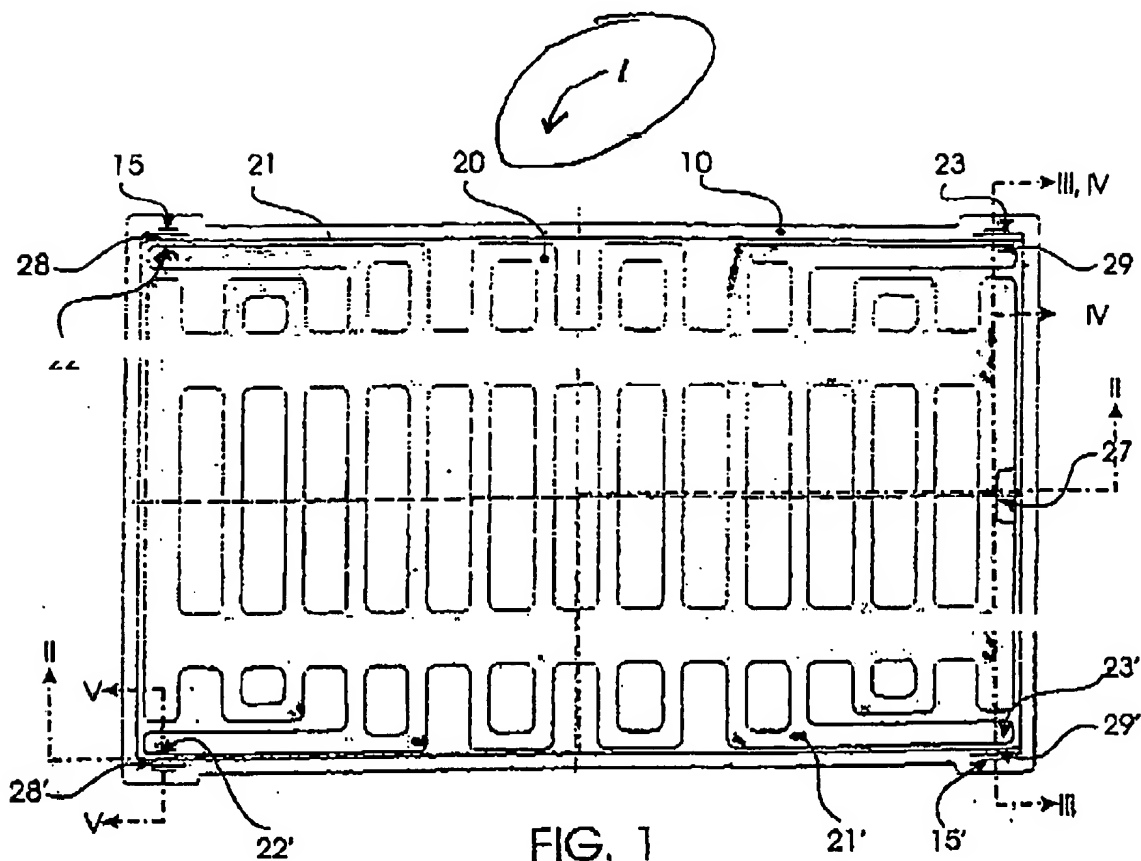
Dated: January 10, 2007

Respectfully submitted,

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 Doctel No.: 20037.1000USWO  
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 ANNOTATED SHEET



Appl. No. 10/550379  
Substitute Specification Showing  
Changes  
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**COVER ARRANGEMENT**

5

RELATED U.S. APPLICATIONS

Not applicable.

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STATEMENT REGARDING FEDERALLY SPONSORED  
RESEARCH OR DEVELOPMENT

Not applicable.

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REFERENCE TO MICROFICHE APPENDIX

Not applicable.

20

FIELD OF THE INVENTION

[0001] The invention relates to a cover arrangement for a surface drainage device or similar hollow body that can be installed in the ground and is to be opened.

BACKGROUND OF THE INVENTION

[0002] Such cover arrangements, for example to be used on street drains or the like, are known. For instance, the patent DE 3523423 C1 discloses a hinged gully top consisting of a frame and a grating, constructed so that hinge bolts can be inserted or screwed into the frame from outside. Hence it is a simple matter to open the grating by means of these hinges. This offers the advantage that, for example during cleaning and maintenance work, the grating does not need to be lifted completely out of the

frame, but when necessary can simply be pivoted upward. The result is not only a reduction of the effort expended and the risk of injury during cleaning and maintenance work, but in addition the grating is secured against theft. The disadvantage  
5 of this design is that to disassemble the grating, the frame must be exposed in the hinge region in order to provide access to the hinge bolts. This inevitably involves damage to the adjacent pavement surface and hence a not inconsiderable expenditure of effort and materials in order to remove or exchange the grating.  
10 Furthermore, with this design the direction in which the cover arrangement is pivoted when raised must already be taken into account during installation, in order to ensure that the raised cover or grating is not opposed to the oncoming vehicles. A grating raised in such a way would seriously endanger the  
15 traffic.

[0003] Furthermore, in most of the known hinged cover arrangements there is nothing to prevent vandals from raising the grating or cover, because the cover arrangements can usually be  
20 tilted up without any special tool. In this case both the grating, projecting upward from the pavement, and the opening thus left in the shaft cover are a major source of danger.

[0004] The patent DE 299 14 492 U1 discloses a shaft cover with  
25 hinge bolts that are accessible from inside, which offers the advantage that, for example when the cover is being exchanged, the frame need not be exposed in the region where the hinge bolts are being attached. In other respects, this design involves the same disadvantages as the shaft covers previously described.

30  
[0005] The patent DE 1834483 U1 discloses a hinge device consisting of 2 joint cogs, each of which lies in a cavity within a separate bracket on a grating. These two brackets are set into corresponding receptacles on the frame, so that the joint cogs  
35 lying loosely in the cavity slide partially into corresponding

cavities within the frame and thus connect the grating or cover firmly to the frame. The joint cogs here are, for example, spherical in shape and are rolled by gravity into the associated cavities within the frame, or they consist of cylinders supported  
5 on springs, which are pressed into the associated frame cavities by the spring force. A disadvantage of this design is that the hinge mechanism for the cover arrangement consists not of a single part but rather of several individual elements. These must be installed in the cover device after it has been cast, which is  
10 cost-intensive. Furthermore, the presence of extra parts also increases the likelihood of faults developing, because such parts can be lost, and this system is very vulnerable to dirt, because such small parts (springs, balls) are readily harmed by corrosion and dirt. Another disadvantage is that once the grating has been  
15 installed, great effort is required to remove it. And in this design, again, there is the problem that the installation orientation depends on the direction of vehicle travel. If the traffic direction changes, great effort is required to adapt the grating accordingly.

20

#### BRIEF SUMMARY OF THE INVENTION

[0006] It is the object of the present invention to provide a cover arrangement for a surface drainage device or similar hollow  
25 body that can be installed in the ground and is to be opened in such a way that the arrangement is economical as well as simple to manufacture and to use.

[0007] According to the present invention there is provided a  
30 cover arrangement for a surface drainage device or similar hollow body that is adapted to be installed in the ground and to be opened, comprising a rectangular frame adapted for installation in the ground and defining a plurality of insertion openings; a cover adapted for insertion into the frame; hinge devices that  
35 retain the cover in the frame and enable the cover to be pivoted

upward in an opening direction out of the frame; and latch devices by means of which the cover is adapted to be locked into the frame so that it will not open; at least one of the hinge devices and the latch devices comprising ~~spring-action~~ flexible cast rods that are integrally connected to the cover; and the hinge devices and the latch devices both defining projections, at least one of which can be inserted into the insertion openings defined by the frame, as desired.

[0008] The essence of the invention resides in the fact that the cover arrangement, consisting of a frame and of a cover that can be inserted into this frame, comprises hinge devices and/or latch devices integrally formed on ~~spring~~ flexible rods that, in turn, are integrally formed on the cover. Advantageously, the cover consists of cast material, in particular cast iron, preferably spheroidal graphite cast iron. Here the hinge devices serve to provide a pivotable bearing of the cover in the frame, and the latch devices lock the cover to the frame so as to prevent it from unintended opening. In this design, of course, the hinge devices can also be hinge devices such as are already known from the state of the art; conversely, it is of course conceivable for the latch device to be designed in the conventional manner and for only the hinge device to be constructed in accordance with the invention.

[0009] The invention exhibits a number of substantial advantages in comparison with cover arrangements known from the state of the art. The implementation of hinge and/or latch ~~units~~ devices that are integrally connected with the cover in the form of ~~spring-action~~ flexible cast rods is an extremely economical and in addition advantageous solution. For one thing, the number of materials used in manufacturing is reduced to a minimum, and for another the production process comprises distinctly fewer steps. Because the cover arrangement consists of only two individual parts, it is less susceptible to failure, because none of the



parts can be lost (for instance, at the construction site). Furthermore, the embodiment according to the present invention is distinctly more resistant than known constructions. For example, failure as a result of corrosion or contamination with dirt would  
5 not be expected here.

[0010] The construction of the hinge and/or latch device in accordance with the invention offers major advantages with respect to handling of the cover arrangement. The construction of  
10 the latch device in accordance with the invention enables rapid and simple opening of the cover device; the construction of the hinge device in accordance with the invention represents an economical and furthermore functionally reliable hinge construction. Installation of the cover in the frame is  
15 accomplished very simply and rapidly because the hinge and/or latch devices are constructed as ~~spring-action~~ flexible cast rods. The hinge/latch devices need merely be pressed into the corresponding bearing recesses formed in the frame. For this purpose the cover is pressed into the frame, which procedure  
20 initially deflects the integrally formed latch or hinge structures and then causes them to become caught in the bearing recesses, thus connecting the cover to the frame. In order to release and open the cover, a releasing tool must be used to apply a force to the ~~spring~~ flexible rod of the latch device in  
25 accordance with the invention in a direction substantially perpendicular to the opening direction. This deflects the ~~spring~~ flexible rods into a temporary opening position, allowing the latch structures to slide out of the bearing recesses, which enables the cover to swivel open.

30

[0011] Simultaneous employment of the latch and hinge devices in accordance with the invention for a given cover results in a cover arrangement that can be economically manufactured, is resistant and versatile, and can be operated in a simple manner.  
35 However, it should be mentioned that if desired, it is also

possible to use a cover arrangement in which only one of the two elements in accordance with the invention is combined with an element that is already known from the state of the art - for example, a cover arrangement having latch devices in accordance with the invention as well as conventional hinge devices screwed to the frame, such as are known from the state of the art.

[0012] Because the opening mechanism of the latch device in accordance with the invention is concealed, the cover arrangement is also protected from an undesired opening, or opening by unauthorized persons. First, the latch mechanism cannot very easily be identified, and second, it is difficult or impossible to open the cover without a suitable releasing tool. Hence the cover is secured against vandalism and theft; the danger that a cover will be left raised and/or the shaft open unintentionally is significantly reduced.

[0013] It is generally the case that in a cover arrangement according to the present invention the frame and the cover not only each consist of a single part, but also can both be made of a single material. This reduces both the costs and the time required for production, because only a small number of processing stages are needed.

[0014] A preferred further development is construction of the latch devices in accordance with the invention so that they comprise beveled surfaces for initial contact. Owing to these beveled surfaces the latch device is bent into an opening position by a force that acts on the cover in the opening direction. Release of the cover from the frame is thus simplified. With this further development it is no longer necessary to press the latch projections out of their bearing recess in the frame by lateral pressure on the associated spring flexible rod. Application of a force in the opening direction causes the projections to slide out of their latched position.

Hence the process of releasing the cover becomes even faster and more reliable.

[0015] Another embodiment consists in situating hinge devices  
5 and latch devices on the cover identically in such a way that the  
cover can be opened toward either of two sides, as desired. Thus  
the cover can be manufactured so to speak as a unitary cover,  
because there is no need to be concerned with a particular  
opening direction and the associated dispositions of the hinges  
10 and latches. This embodiment allows the hinge device to function  
as both hinge and latch, depending on the side toward which the  
cover is to be opened. In this case the cover can be opened by  
rotation about an axis along the two pairs of hinges or latches.  
Now if a force acts perpendicular to the opening direction,  
15 preferably in the region between the two hinges, the hinges or  
latches can be pressed out of their bearings; in this case,  
therefore, the hinge ~~unit~~ device has a latch function. An  
advantage of this solution in accordance with the invention is  
that, for example when the traffic flow is altered, there is no  
20 need to undertake reconstruction of the cover arrangement,  
because the cover can be opened toward both sides and hence is  
independent of the traffic direction.

[0016] If the hinge device is constructed such that it can be  
25 released from the frame by a force acting substantially  
perpendicular to the opening direction, complete exchange of the  
cover can be carried out with no great effort and in the shortest  
time. To release the connection between frame and cover, the  
hinge projections can simply be pushed out of the bearing recess  
30 by applying lateral pressure to the ~~spring~~ flexible rods. Thus  
removal of the entire cover is possible with no need for  
operations on the frame or the surrounding traffic surface. In  
addition, the problem of soiled or rusted hinge attachments and  
locks is eliminated.

35

[0017] The arrangement includes providing the frame with insertion bevels so that either hinge projections or latch projections can be inserted, as desired. These insertion bevels make it easier to put the cover in place. The hinge or latch  
5 projections formed on the cover need merely be set onto the insertion bevels and pushed into the corresponding bearing recesses on the frame by gentle pressure. Installation of the cover can be accomplished in this way without a tool, which makes the process of assembly simpler and more economical. Because both  
10 the hinge and the latch projections can slide into the associated bearing recesses along these insertion bevels, if the cover is symmetrically constructed the frame can of course also be employed in a direction-independent manner. Furthermore, these slanted insertion surfaces minimize the risk that the latch or  
15 hinge devices may strike against the frame edge and break as a result of being carelessly inserted or closed.

[0018] Preferably the frame and the cover are provided with contact surfaces that engage one another when the cover is  
20 closed. This alleviates the load on the latch or hinge ~~units~~ devices, because imposed traffic loads are transferred into the frame by way of these contact surfaces and from there into the substrate. Hence the forces acting here no longer need to be conducted into the frame by way of the projections of the hinge  
25 and/or latch ~~units~~ devices or other hinge or latch devices constructed according to the state of the art. As a result, the cover arrangement according to the present invention can be installed even in traffic surfaces with very high traffic loads.

30 [0019] If desired, the cover and the frame of the cover arrangement can be provided with lateral apertures. These apertures serve as places in which to set a releasing tool with which the cover can be raised. In this case it is possible to construct these apertures such that only a special, appropriately  
35 designed tool can successfully be used to open the cover. This

decisively increases the degree to which the cover is secured against theft. Furthermore, of course, the risk that it will be opened by unauthorized persons is also avoided.

5 [0020] It is likewise sensible for the apertures in which a releasing tool is placed to be disposed only at the sides of the cover or the frame where raising of the cover is actually possible. This prevents the releasing tool from being positioned on sides that are not intended to be raised, and thus avoids  
10 unintentional damage to hinge ~~units~~ devices, because the side on which the cover can be raised is clearly visible.

[0021] The frame of the cover arrangement can be made of any adequately solid material, for example metal or plastic. The  
15 cover, on the other hand, should preferably be made of spherical graphite cast iron, which surprisingly is sufficiently elastic for these purposes. Naturally, however, it is also possible to use other appropriate materials. Depending on the materials used and their elasticity, the cover arrangement is more or less easy  
20 to open. A stiff material results in an opening mechanism that moves with difficulty, whereas the use of more flexible materials produces a more easily operable opening mechanism. Hence by appropriate choice of the material of which the cover is made, the manner of function and/or the locking strength of the opening  
25 mechanism can be influenced.

[0022] It should be pointed out that the cover arrangement according to the present invention can also have another, non-rectangular shape with respect to its basic outline. The  
30 construction of latch and/or hinge ~~units~~ devices on ~~spring~~ flexible rods formed integrally with a cover is also possible, for example, with a round or oval cover.

[0023] Advantageous further developments of the invention are  
35 also disclosed in the subordinate claims.

[0024] An embodiment of the invention will now be described by way of example with reference to the accompanying drawings.

5

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] Fig. 1 is a plan view of an embodiment of the invention;

10 [0026] Fig. 2 shows a longitudinal section along the line II-II in Fig. 1;

[0027] Fig. 3 shows a cross section along the line III-III in Fig. 1;

15 [0028] Fig. 4 shows a section along the line IV-IV in Fig. 1; and

[0029] Fig. 5 shows a section along the line V-V in Fig. 1.

20

DETAILED DESCRIPTION OF THE INVENTION

[0030] In the following description, the same reference numerals are used for identical parts or parts with identical actions.

25 [0031] Figure 1 is a plan view of a cover arrangement 1 in one embodiment of the invention. The cover arrangement 1 comprises a frame 10 that can be installed in the ground, a cover 20 that can be inserted into the frame 10, two hinge devices 22, 22' by way of which the cover 20 is retained in the frame 10 so that it can  
30 be tilted upward in an opening direction, and latch devices 23, 23' by means of which the cover 20 can be locked to the frame 10 so that it cannot be opened; here the hinge devices 22, 22' and the latch devices 23, 23' are formed on ~~spring-action~~ flexible cast rods 21, 21' by way of which they are integrally connected  
35 to the cover 20. Fig. 1 additionally shows an aperture 27 for a

releasing tool 40, disposed on the side on which the cover 20 can be raised. On all four sides insertion bevels 15, 15' are provided on the frame 10, which enable the cover 20 to be put into place more easily. The hinge projections 28, 28' and/or the latch projections 29, 29' disposed on the side where the latch devices 23, 23' are situated simply slide over these insertion bevels 15, 15' into corresponding bearing recesses 16 in the frame 10 (see Figs. 3, 4). Also clearly visible in Fig. 1 is the integral construction of the latch and hinge devices 23, 23' and 22, 22', on the cast-iron ~~spring~~ flexible rods 21, 21' of the cover 20. It should be pointed out that the design of the cover 20 as a grating, shown in Fig. 1, is presented purely as an example. Naturally every other design, for instance as perforated sheet metal or a substantially closed surface, is also possible.

[0032] Figure 2 shows a cross section along a line II-II through the embodiment according to Fig. 1. The partially opened cover 20, as well as the position of the releasing tool 40 after the cover arrangement 1 has been opened, are represented here by dashed lines. In Fig. 2 it is clear that when traffic loads F are applied, they are not conducted away through the cover 20 into the latch and/or hinge ~~units~~ devices, 23 and/or 22; instead, these forces F are transferred by way of seating surfaces 24, 24' on the cover 20 into seating surfaces 14, 14' on the frame 10. The seating surface 14, 14' on the frame 10 is represented in Fig. 2 and Fig. 3 and formed by narrow corbel or shelf. This surface 14, 14' can, of course, also be constructed differently, for example as a small plateau with an area equivalent to that of the corresponding seating surface 24, 24' on the cover 20. This prevents dirt from accumulating on this plateau.

[0033] Figure 3 shows a cross section along the line III-III through the embodiment according to Fig. 1, which makes evident the integral construction of the latch ~~unit~~ device 23, 23' on the ~~spring~~ flexible rod 21, 21'. Here slanted carrier surfaces on a

latch projection 29, 29' facilitate opening of the cover 20, because imposition of a force  $F^1$  in the opening direction causes the latch projections 29, 29' to be pressed out of the bearing recess 16, 16' in the frame 10. The insertion bevels 15, 15' on the frame 10 enable the latch projections 29, 29' on the cover 20 easily to slide into the bearing recesses 16, 16' on the frame 10 when the cover 20 is closed. The numeral 14 designates the seating surface 14' on the frame 10, by way of which the force  $F$  exerted by the traffic load is transferred into the frame 10 and from there into the substrate.

[0034] In Figs. 4 and 5 the details of the latch and hinge ~~units~~ devices 23 and 22', respectively, are shown in section along the lines IV-IV and V-V in Fig. 1. It is evident here that the hinge ~~unit device~~ 22' represented in Fig. 5 cannot be released from its anchoring by a force  $F^1$  applied as drawn in the figure. Instead, to release the connection between frame 10 and cover 20 a force  $F^2$  is needed, which acts on the ~~spring~~ flexible rod 21 in a direction perpendicular to the traffic load  $F$ , i.e. to the opening plane. Such a force pulls the hinge projection 28' out of the bearing recess 16 and releases the cover 20 from the frame 10. In Fig. 4 it is made clear that the force  $F^1$  causes opening of the cover 20, because its beveled contact surface 25 allows the latch ~~unit device~~ 23 to slide out of the associated bearing recess 16 in the frame 10, enabling the cover 20 to open. In this embodiment the hinge ~~unit device~~ 22', which is made integral with the ~~spring~~ flexible rod 21, is distinguished from the latch ~~unit device~~ 23 (likewise integral with a ~~spring~~ flexible rod 21) merely by the absence of this beveled contact surface 25, which enables sliding out of the bearing recess 16 in the frame 10.



~~List of reference numerals~~

- ~~1 — Cover arrangement~~  
~~10 — Frame~~  
5 ~~14, 14' — Contact surface~~  
~~15, 15' — Insertion bevels~~  
~~16, 16' — Bearing recess~~  
~~20 — Cover~~  
~~21, 21' — Spring action cast rod~~  
10 ~~22, 22' — Hinge device~~  
~~23, 23' — Latch device~~  
~~24, 24' — Seating surface~~  
~~25, 25' — Beveled contact surface~~  
~~27 — Aperture for releasing tool~~  
15 ~~28, 28' — Hinge projection~~  
~~29, 29' — Latch projection~~  
~~40 — Releasing tool~~  
~~F<sup>1</sup> — Force in opening direction~~  
~~F<sup>2</sup> — Force perpendicular to opening direction~~  
20 ~~F — Traffic load~~